Health Consultation

Exposure Investigation Workplan
Indoor Air Quality

Farmer's Insurance and Roy's Thriftway Barber Shop
Olympia, Thurston County, Washington

April 4, 2002

Prepared by

The Washington State Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Foreword

The Washington State Department of Health (DOH) has prepared this health consultation in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is part of the U.S. Department of Health and Human Services and is the principal federal public health agency responsible for health issues related to hazardous waste. This health consultation was prepared in accordance with methodologies and guidelines developed by ATSDR.

The purpose of this health consultation is to identify and prevent harmful human health effects resulting from exposure to hazardous substances in the environment. Health consultations focus on specific health issues so that DOH can respond quickly to requests from concerned residents or agencies for health information on hazardous substances. DOH evaluates sampling data collected from a hazardous waste site, determines whether exposures have occurred or could occur, reports any potential harmful effects, and recommends actions to protect public health.

For additional information or questions regarding DOH, ATSDR or the contents of this Health Consultation, please call the health advisor who prepared this document:

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Purpose

The Washington State Department of Health (DOH) conducted an exposure investigation to evaluate whether people who work at two businesses located above an area of contaminated soil and groundwater are being exposed to harmful levels of chemicals which have the potential to migrate from these media into indoor air at these businesses. The purpose of this health consultation was to develop a protocol that outlines the exposure investigation's objectives and tasks. A separate health consultation will be prepared which will evaluate the results of the indoor air sampling analysis.

Background and Statement of Issues

Thurston County Public Health and Social Services Department (TCHD) requested DOH's assistance in evaluating whether tetrachloroethylene (PCE), and other volatile organic compounds (VOCs) are present at levels of health concern in indoor air at two small businesses; Farmer's Insurance (Farmer's) and Roy's Thriftway Barber Shop (Roy's). Both businesses are located in a "strip mall," and adjacent to a dry cleaning and self-laundry operation (Eastside Laundry-Cleaners), in Olympia, Washington. Adjacent land use includes other small businesses, and residences (Appendix A).

Recent soil and groundwater testing in the immediate vicinity of Eastside Laundry-Cleaners revealed elevated levels of PCE in the groundwater, and low levels of PCE and several other petroleum-related chemicals in soil. The results of the environmental testing are presented in Table 1. Farmer's employees have worked there for over 30 years, and are concerned about the potential migration of contaminants from soil and groundwater into indoor air. Although employees of Roy's have not expressed any health concerns, DOH and TCHD included Roy's in the evaluation because of its proximity to the contamination.

Low concentrations of PCE were first discovered in subsurface soil near Eastside Laundry in March 2000. Subsequent investigations conducted in the same area during April 2001 and August 2001 revealed low levels of PCE and several petroleum hydrocarbons in the soil, and a moderately high level of PCE in the groundwater. Soil samples were collected directly beneath and outside the Eastside Laundry building. Groundwater samples were collected in August 2001 at two locations outside of the building (Appendix A).

Chemical contamination was detected at depths between 55 and 90 feet below ground surface (bgs) in the groundwater, and between one foot and 105 feet bgs in the soil. Groundwater, including perched water, was encountered at depths ranging from approximately 50 to 90 feet bgs.

Table 1

Chemicals detected in soil and groundwater
Eastside Laundry-Cleaners site, Olympia, Washington *

Chemical	March 2, 2000		April 3 and 4, 2001		August 1, 2, and 22, 2001	
	Media		Media		Media	
	Soil (mg/kg) 14' - 16' BGS	Groundwater (µg/liter)	Soil (mg/kg) 1' - 34' BGS	Groundwater (µg/liter)	Soil (mg/kg) 10' - 105' BGS	Groundwater (µg/liter) 55' - 90' BGS
Tetrachloroethylene (PCE)	0.17 - 0.54	NA	ND - 39.9 (5' BGS)	NA	ND - 0.82	11 - 480
Toluene	ND	NA	ND - 1	NA	ND	ND
Total Xylenes	ND	NA	ND - 1.8	NA	ND	ND
Ethylbenzene	ND	NA	ND - 0.23	NA	ND	ND

mg/kg = milligrams of chemical per kilogram of soil (equals part per million)
µg/liter = microgram of chemical per liter of water (equals part per billion)
ND = not detected
NA = not analyzed
BGS = below ground surface

* Health comparison values are not listed in this Table since direct contact with the soil and groundwater is not occurring. This table was included in this health consultation to develop contaminants of concern for the indoor air pathway.

Exposure Pathways

VOCs in soil and groundwater can migrate upwards into the overlying soil, and can be released into indoor air where people can become exposed. Because considerable dilution occurs when the groundwater contaminants are released into outdoor air, it is unlikely that people are being exposed to harmful levels of VOCs outdoors. As a result, outdoor air is not considered a significant exposure source, and were not be sampled as part of this exposure investigation.

Exposure Investigation Tasks

Indoor air samples were collected by DOH and TCHD from January 8 to January 9, 2002. DOH considers this to be a likely "worst-case" sampling event, as groundwater elevations are at or near their highest this time of year (i.e., nearer to ground surface than during the summer months). As a result, levels of VOCs in indoor air attributable to migration from soil and groundwater underneath the site should theoretically be at highest concentration. Other possible sources include air emissions from the adjacent dry-cleaning operation, and to a lesser degree, other localized, ambient sources that could release VOCs into ambient air, such as automobile emissions. To the extent possible, DOH will assist TCHD and Ecology in assessing the source(s) of VOCs, if detected above levels of health concern in indoor air. Although background air samples were not collected as part of this air quality investigation, the literature will be reviewed to estimate typical, urban indoor and outdoor levels of the chemicals of concern. The published background values will be compared to levels detected in indoor air.

The sampling and analysis plan, which is outlined below, was developed by DOH, in consultation with TCHD. TCHD contacted employees and the property owner in advance of the sampling to obtain access to the properties. The air samples were collected by DOH using air sampling equipment supplied by Atmospheric Analysis & Consulting, Inc. (AAC) of Ventura, California. AAC analyzed the air samples at their own laboratory.

The analytical results of the indoor air testing will be evaluated by DOH. to determine whether levels of chemicals detected in Farmer's and Roy's pose a threat to human health through the inhalation route of exposure. An exposure investigation report will be prepared by DOH, in cooperation with ATSDR, summarizing the results of the evaluation. Recommendations for source control and/or exposure reduction will be included in the exposure investigation report, if necessary.

Exposure Investigation Sampling and Analysis Plan

The sampling and analysis plan provides detailed guidance for sampling and other data gathering methods to be used during the indoor air sampling.

Site Background

Subsurface soil and groundwater investigations conducted during the spring of 2000 and the spring and summer of 2001 revealed tetrachloroethylene (PCE) in groundwater, and PCE, toluene, ethylbenzene, and xylene in soil in the immediate vicinity of a dry-cleaning and self-laundry business (Eastside Laundry-Cleaners). The contamination was detected at depths ranging from one to 105 feet below ground surface (bgs). Employees of Farmer's Insurance, an adjacent business, have expressed concern about the possibility of these contaminants diffusing into the building. The employees have worked in the Farmer's Insurance office for 35 years.

Sampling Objectives

The objective of the indoor air sampling was to obtain 24-hour air samples from Farmer's Insurance, the subject business, and Roy's Thriftway Barber shop, an adjacent business. Both businesses are located next to an active dry-cleaning operation, and above areas of soil and groundwater contamination. The indoor air sampling results will be used by DOH to evaluate whether people who work inside the businesses are being exposed to harmful levels of contaminants in the air.

Sample Location and Frequency

Indoor air samples were collected from Farmer's Insurance and Roy's Barber Shop. The specific sampling locations are summarized in Table 2, and are shown in Appendix A. The canister intake was set at a height that corresponds to the general breathing zone within the rooms sampled. Sampling locations included the main work areas, and a break room at the rear of the Farmer's Insurance business.

Table 2

Indoor Air Sampling Locations and Times

Sample Number	Sample Location	Sampling Start Time	Sampling Dates
FI-WA-1	Farmer's Insurance/main work area	11:15 AM	Jan. 8-9, 2002
FI-BR-1	Farmer's Insurance/back room	11:20 AM	Jan. 8-9, 2002
RBS-WA-1	Roy's Barber Shop/main work area	11:30 AM	Jan. 8-9, 2002

Table 3
Meteorological Conditions at Time of Sampling

Date	Location	Temperature Indoor/Outdoor	Barometric Pressure	Wind Speed	Weather Conditions
1/8/02	Farmer's Insurance	65.1/48	30"	SSW 4	Light rain/mist
1/8/02	Roy's Barber Shop	69.4/48	30"	SSW 4	Light rain/mist
1/9/02	Farmer's Insurance	65.1/43	30.29"	N 4	Overcast/no rain
1/9/02	Roy's Barber Shop	69.4/43	30.29"	N 4	Overcast/no rain

Sample Designation

The sample designations were pre-assigned for each indoor air sample as shown on Table 2.

Sampling Equipment and Procedures

The indoor air samples were collected using SilicoCan 6-L, stainless steel canisters with a passive flow regulator. The canisters were evacuated to a pressure that, in conjunction with the pre-set flow regulator, draws for 24-hours. Sampling instructions, provided by Atmospheric Analysis & Consulting, Inc. (AAC) are included as Appendix C.

Sample Analysis

Samples will be analyzed for VOCs by EPA Method TO-15, which includes a list of 65 chemical analytes. After careful evaluation of site environmental sampling data, DOH determined that PCE, PCE degradation products (trichloroethylene, dichloroethylene, and vinyl choride), toluene, xylenes, and ethylbenzene were the primary chemicals of concern which should be evaluated in indoor air. As a result, DOH requested results only for these analytes, and not the full suite of 65 analytes. Based upon previous site sampling data, and the types of businesses which operated at the site, there is no reason to believe that other types of contaminants are present. Although the results of the other analytes were not specifically requested by DOH, they will remain on file at the lab for future reference. DOH requested that AAC report any other chemical detections which appear unusually elevated.

Documentation

Photographs were taken of each sample location. Details such as sample location descriptions, sample identification numbers, canister numbers, sample times and date, meteorological conditions, and other relevant information was recorded in a field log, and on the laboratory data sheets. Copies of the laboratory data sheets were retained for DOH's records.

Data Quality Assessment

In addition to the laboratory analysis report, AAC will include method blank analysis reports, and quality control/quality assurance reports. The laboratory analytical data generated during the exposure investigation did not undergo additional validation.

Schedule

The indoor air sampling was conducted on January 8, 2002, and terminated on January 9, 2002.

Project Organization and Responsibility

Thurston County is the lead for the exposure investigation. DOH and Thurston County staff conducted the indoor air sampling. Atmospheric Analysis & Consulting, Inc. provided the sampling equipment and analyzed the samples. DOH, in cooperation with ATSDR, will review and evaluate the data and prepare the exposure investigation report.

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Child Health Initiative

ATSDR recognizes that infants and children may be more vulnerable to exposures than adults when faced with contamination of air, water, soil, or food.[7] This vulnerability is a result of the following factors:

- Children are more likely to play outdoors and bring food into contaminated areas.
- Children are shorter and their breathing zone is closer to the ground, resulting in a greater likelihood to breathe dust, soil, and heavy vapors.
- Children are smaller and receive higher doses of chemical exposure per body weight.
- Children's developing body systems are more vulnerable to toxic exposures, especially during critical growth stages in which permanent damage may be incurred.

The Eastside Drycleaners site, which includes Farmer's Insurance and Roy's barbershop, are located in a residential and commercial area where children potentially could be exposed to site contaminants through the indoor air exposure pathway. When evaluating the indoor air sampling results, special attention will be given to the unique susceptibility of infants and children who could potentially be exposed inside the buildings where the samples were collected.

Conclusions

Indoor air quality at Farmer's Insurance and Roy's barbershop poses an indeterminate health risk since information about the levels of VOCs is not currently available. When the results are available, DOH will evaluate them to determine whether a public health hazard exists.

Recommendations/Action Plan

1. The results of the indoor air sampling investigation should be provided to DOH for evaluation. Sampling results should also be provided to the employees of the businesses tested, and to the property owner.

2. DOH will evaluate the indoor air sampling results, and recommend actions to reduce or eliminate exposures, if necessary. Recommendations may also include further source characterization, source control, and/or additional indoor air sampling.

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References

1. G-Logics, Inc. Additional Subsurface Exploration and Installation of Groundwater Monitoring Wells, Eastside Laundry. October 2, 2001.

2. G-Logics, Inc. Subsurface Exploration: Parcel with Dry Cleaning Business, Olympia, Washington. May 3, 2001.

3. G-Logics, Inc. Phase II Environmental Assessment (Limited Soil Sampling and Testing), The Stormans, Inc. Project. Olympia, Thurston County, Washington. March 22, 2000.

4. Personal communication with Gerald Tousley, Hazardous Waste Specialist, Thurston County Public Health and Social Services Department. November 2001 - January 2001.

5. Personal communication with Dr. Sucha Parmar, Atmospheric Analysis & Consulting, Inc. December 2001 - January 2002.

6. Washington State Department of Health. Health Consultation: Exposure Investigation Workplan, Indoor Air Quality, Philip Services Corporation - Georgetown Neighborhood, Seattle, King County, Washington. June 15, 2001.

7. Agency for Toxic Substances and Disease Registry. Interim guidance on including child health issues in Division of Health Assessment and Consultation Documents. Atlanta: US Department of Health and Human Services, Public Health Service, July 1998.

Appendix A

Figures

Appendix B

Consent Form

Farmer's Insurance/Roy's Thriftway Barber Shop
Olympia, Washington
98506

I hereby consent to employees of the Washington State Department of Health (DOH) and Thurston County Public Health and Social Services Department (TCHD) access to the property indicated above for the collection of indoor air samples.

I understand that DOH is working in conjunction with the Agency for Toxic Substances and Disease Registry (ATSDR), and that these agencies are acting under mandates provided under state and federal law.

I am the property owner, or an individual having authority or the authorization of the property owner, to make this access agreement.

This written permission is given by me voluntarily, with full knowledge of my rights to refuse and without threats or promises of any kind.

Name

Signature

Date

Appendix C

Indoor Air Sampling Instructions
Atmospheric Analysis & Consulting, Inc.

Appendix D
Laboratory Data Sheet

Certification

This Health Consultation was prepared by the Washington State Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

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Debra Gable
Technical Project Officer, SPS, SSAB, DHAC
ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

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Richard Gillig
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